

REMARKS/ARGUMENTS

Claims 1-10, 14, 16-18, and 20-24 are currently pending in the present application.

Claims 7, 9, 14, and 16 are amended, and claim 19 is deleted without prejudice or disclaimer. In particular, as discussed below, the claims have been amended in accordance with the Office's suggestions, and not to limit their original scope. Support for these amendments can be found throughout the specification, as originally filed.

No new matter has been added by the amendments. Reconsideration of the claims is requested in view of the remarks below.

Rejections under 35 U.S.C. § 102(b) and/or § 103(a)

The rejection of claim 1 under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over EP 0196162 to Chaudhry is respectfully traversed.

Chaudhry does not describe, either expressly or inherently, all of the elements of the method of avoiding induction times during the inverse emulsion polymerization of free-radically polymerizable water-soluble and/or water-dispersible monomers recited in claim 16. *See* generally MPEP § 2131 (indicating that a reference must describe every element of a claim, expressly or inherently).

Chaudhry generally describes a water-in-oil emulsion of a water-soluble polymer, in which the water-soluble polymer is a direct product of an inverse emulsion polymerization process. *See* Abstract. In particular, the polymerization can be effected using known redox or thermal free radical initiators, which may be oil or water-soluble. Moreover, it is noted that in Example 1, on page 4, line 15 and page 5, line 21 of the reference, a polymerization reaction is described in which 0.2 parts ammonium persulfate in one part water and 0.1 parts sodiummethabisulphite in 5 parts water are used as redox catalysts.

In contrast to the process of Chaudhry, claim 16 of the present application recites a method for avoiding induction times during the inverse emulsion polymerization of free-radically polymerizable water-soluble and/or water-dispersable monomers is claimed, in which *2-hydroxy-2-sulfinato-acetic acid and/or salts thereof* is used as a reducing agent.

In particular, claim 16 specifies the reducing agent as *2-hydroxy-2-sulfinato acetic acid and/or a salt thereof*, in order to avoid any induction time during the inverse emulsion. It is noted that Chaudhry indicates that any redox or thermal free radical initiators, which may be oil or water-soluble, can be used as polymerization initiators. However, as recited in the examples according to Chaudhry, a combination of ammoniumpersulfate and sodiummethabisulphite are exclusively used as the initiator. As such, Chaudhry clearly does not anticipate the claimed invention.

Further, there is no suggestion or motivation to modify the reference to include all of the elements, e.g., the reducing agent, of the claimed method; and there is clearly no indicated reasonable expectation of success in so doing. See MPEP § 2143 (reciting the required three basic criteria for establishing a prima facie case of obviousness). Applicants also point out that there is no apparent reason for one skilled in the art to specifically implement the reducing agent in the method as presently claimed. See *KSR Int'l Co. v. Teleflex, Inc.* No. 04-1350, slip op. at 14-15 (U.S. Apr. 30, 2007) (the Supreme Court explaining that there must be “a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does,” and indicating that this reason must be “apparent”).

In particular, there does not appear to be any apparent reason for one to implement any elements, other than the combination of ammoniumpersulfate and sodiummethabisulphite in an initiator system, as described in the reference. Specifically, there is no indication, other than the present specification, that it would be advantageous to use 2-hydroxy-2-sulfinoacetic acid and/or salts thereof as the reducing agent of a redox initiator system, such that the polymerization reaction begins immediately after addition of said initiator system, and that no induction period can be observed.

Applicants point out the Examples 1-42 of the present specification clearly show that no induction period is present, in which 2-hydroxy-2-sulfinatoacetic acid disodium salt is used in combination with sodiumpersulfate as an polymerisation initiator, and no induction period can be observed. In particular, these examples clearly show that the presence of 2-hydroxy-2-sulfinatoacetic acid disodium salt has the effect that the induction period can be decreased to 0.

Chaudhry, on the other hand, does not mention or even address any technical issue relating to long induction times in inverse emulsion polymerization processes. As such, it clearly would not be apparent from Chaudhry that 2-hydroxy-2-sulfinatoacetic acid or a salt thereof would decrease induction time.

Applicants further note the following regarding the Examples of the present application. Applicants have conducted experiments that can show that the induction time of an inverse emulsion polymerization reaction can be avoided and that the polymerization reaction starts more effectively, when 2-hydroxy-2-sulfinatoacetic acid is used as the reducing agent of a redox initiator.

In Example 27 (see Examples 27-29 on page 25 of the present specification), 2-hydroxy-2-sulfinatoacetic acid (Bruggolit FF6) was used in combination with sodium persulphate. The polymerization reaction started immediately without any induction time. In comparison to this experimental example, another experimental example in accordance with Chaudhry was conducted, in which a combination of ammonium persulphate and sodium metabisulphite was used as a redox initiator.

Although the polymerization reaction also started essentially at once after the addition of the initiator, a difference between the polymerization reaction according to the present invention and Chaudhry is noted as follows:

The temperature profiles of both reactions were recorded after addition of the initiators. In the reaction mixture according to Example 27 of the present specification, the temperature rose faster and higher than the temperature in the reaction mixture of the polymerization reaction according to Chaudhry. In particular, the faster and higher rise of the reaction temperature is a proof that more polymer chains were started at the same time, and that more heat energy was produced in the reaction mixture. This result demonstrates that 2-hydroxy-2-sulfinatoacetic acid is able to avoid the induction time in an inverse emulsion polymerization reaction and, in addition, makes it possible that the polymerization reaction is started more effectively, since more polymer chains are started after addition of the initiator. The specific reducing agent 2-hydroxy-2-sulfinatoacetic acid therefore clearly is advantageous over the reference.

Therefore, for at least these reasons, the claimed method would not be obvious in view of Chaudhry.

Accordingly, withdrawal of the rejection is kindly requested.

Rejections under 35 U.S.C. § 103(a)

The rejection of claims 1-10, 14 and 17-24 under 35 U.S.C. § 103(a) as obvious over Chaudhry in view of US Patent No. 6,211,400 to Berghofer et al. is respectfully traversed.

Chaudhry does not describe or suggest a process for the preparation of water-soluble or water-swellaable homopolymers or copolymers, according to claim 1 of the present invention. Moreover, Berghofer et al. does not remedy the deficiencies of Chaudhry. See MPEP § 2143, discussed *supra*, indicating the basic criteria for establishing a prima facie case of obviousness; see also *KSR Int'l Co. v. Teleflex, Inc.*, *supra*, indicating the reasoning that must prompt a person to combine elements to achieve the claimed invention.

Chaudhry, discussed above, describes any water or oil-soluble initiator systems useful for an inverse emulsion polymerization reaction. See page 3, lines 11-13 of Chaudhry. In contrast, the process according to present claim 1 recites at least one redox initiator pair comprising an oxidizing agent and a reducing agent, wherein the reducing agent is 2-hydroxy-sulfinato acetic acid and/or a salt thereof is used. In particular, *2-hydroxy-2-sulfinatoacetic acid and/or a salt thereof*, as discussed above, is not described at all as the reducing agent of a polymerization initiators system, comprising an oxidizing agent and a reducing agent, in Chaudhry.

However, the Office alleges that a person having ordinary skill in the art would find the suggestion in Berghofer et al., to conduct the process according to Chaudhry using an initiator system comprising an oxidizing agent and a reducing agent, wherein the reducing agent is 2-hydroxy-2-sulfinatoacetic acid and/or a salt thereof.

Regarding Berghofer et al., the reference describes sulfinic acid derivatives, a method for producing them and their use as suitable replacement initiators of formaldehyde sulfoxylates, in order to avoid the elimination of formaldehyde before, during or after use. According to the reference, these compounds can be used as reducing agents in textile

printing and in textile bleaching or wet dyeing or as reducing agents for bleaching minerals, or as cocatalysts in emulsion polymerization together with per-oxidic initiators in order to allow the polymerization to be carried out at lower temperature. See, e.g., column 4, lines 32-36 of Berghofer et al.

It is further noted that Berghofer et al. describes the use of these compounds in emulsion polymerization reactions. It is understood that a person having ordinary skill in the art knows that an emulsion polymerization reaction is conducted in an oil-in-water emulsion, in which the monomers and the initiators may be present in unpolar micelles, and which may be present in the predominantly aqueous solvent. Therefore, the initiator compound should be soluble in the unpolar micelles.

Berghofer et al. describes sulfinic acid derivatives prepared by the reaction that is shown in column 3, lines 53-56 of the reference, and that this reaction is carried out in an aqueous medium. According to column 3, line 66, column 4, line 3, the desired product precipitates out from the reaction mixture or can be precipitated out by adding polar, water-soluble organic solvents. As such, this disclosure indicates that the sulfinic derivatives that are described in Berghofer et al., are insoluble in polar solvents like water. In addition, it is noted that in Example 9 of the reference, an emulsion polymerization reaction is described, in which an oil-in-water emulsion is used.

Therefore, it clearly would not be apparent for one skilled, based on Berghofer et al., to implement 2-hydroxy-sulfinatoacetic acid as a suitable reducing agent in an initiator system, which is used in an oil-in-water-system, in which the unpolar initiator is present in the unpolar micelles.

In contrast to the reference, in claim 1 of the present application, an inverse emulsion polymerization is claimed, which means that a water-in-oil emulsion is present. It is understood that a person having ordinary skill in the art knows that the initiator system that is used in an emulsion polymerization should be soluble in the medium that is present in the micelles. According to the present invention, water is present in the micelles, creating a polar medium.

Therefore, a person having ordinary skill in the art would not consider the disclosure of Berghofer et al., since the reference indicates that 2-hydroxy-sulfiinatoacetic acid is

insoluble in water. In particular, based on the reference, it would seem impossible to bring 2-hydroxy-sulfmatoacetic acid into the micelles of an water-in-oil emulsion, in order to start the polymerization reaction.

Although Chaudhry describes the general use of any oil-in-water-soluble polymerization initiator for an inverse emulsion polymerization, it would not be apparent from this disclosure to use the water-insoluble 2-hydroxy-sulfinatoacetic acid in an inverse emulsion polymerization, which is described in Berghofer et al. as a suitable initiator in a regular emulsion polymerization, having oily micelles in an aqueous phase. In particular, Berghofer et al. does not indicate that 2-hydroxy-sulfinatoacetic acid can also be used in an inverse emulsion polymerization process.

In addition, Applicants point out that none of the cited references describe any of the technical problems resolved by the present invention, short induction times and low amounts of specks and gel bodies. For instance, it is the object of Berghofer et al. that normal emulsion polymerization reactions be conducted at low temperatures, which does not relate to the objects of the present invention.

Applicants further point out that Examples 1-42 of the present specification clearly show that the use of 2-hydroxy-sulfinatoacetic acid and/or a salt thereof gives rise to improved results, when used as the reducing agent of a polymerization initiator system. For example, Table 1 on page 19 shows that a polymerization product can be obtained having specks in amounts of 0.01 % at most, in combination with an amount of gel bodies of 0.24 % at most.

In particular, the absence of specks and gel bodies makes it possible to conduct the polymerization reaction according to claim 1 of the present application without the need to separate all specks by filtration during purification of the water-in-oil emulsion. *See* page 17, line 25 and page 18, line 5 of the present specification. Specifically, as discussed above, gel bodies are present in only minor amounts of 0.01 % or 0.24 % at most, as recited in Table 1. *See* also Example 17 in Table 2, showing specks in amounts of 0.05 % at most, and Example 11 in Table 2, having gel bodies in an amount of 0.28. As such, an expensive and time consuming separation of these bodies can be avoided by the process according to the present invention.

Therefore, the numerous Examples of the present specification, in which polymerization reactions are carried out in accordance with claim 1 of the present application, clearly show that

the process according to claim 1 of the present application provides significant improvement to the polymerization products obtained from the process. In particular, specks and gel bodies are only obtained in minor amounts, which make separating of these particles by filtration very easy or even unnecessary.

In addition, Applicants has conducted further comparative experiments in which the initiator system according to Chaudhry, i.e., ammonium persulphate and sodium metabisulphite, is used in polymerization reactions according to the process of claim 1. These experiments include variations of the amounts of reducing and oxidizing agent and variations of the sequence of addition of the reducing and oxidizing agents. For example, ammonium persulphate was used in amounts of 1000 ppm or 850 ppm, sodium metabisulphite was used in amounts of 5000 ppm or 50 ppm. These amounts of reducing and oxidizing reagent were used in different combinations. The result of all comparative experiments was the same, i.e., the product obtained from the polymerization reaction coagulated during or at the end of the reaction. In addition, significant amounts of swelling particles were obtained.

In comparison to these results of the comparative experiments in Example 27, discussed above, according to the present specification, the product obtained formed a stable expulsion which, when applied in a formulation formed a printable paste. The amount of swelling particles was below 0.01%.

Therefore, the experimental results, according to the present invention and of the comparative experiments according to Chaudhry, show that the very specific reducing agent as claimed in claim 1 gives rise to the advantages, as mentioned above.

In view of the above reasons, the claimed invention is not obvious over Chaudhry in view of Berghofer et al. Therefore, the rejection is improper. Accordingly, withdrawal of the rejection is kindly requested.

Claim Objections

The objections to claims 7, 9, 14, and 19 are obviated by amendment.

In particular, the claim 19 has been deleted, in accordance with the Office's suggestion, to remove a substantially duplicate claim; claim 16 has been amended to correct a minor editorial

and typographical errors; and claims 7, 9, and 14 have been amended to clarify the metes and bounds of the claimed subject matter.

Accordingly, withdrawal of the objection is kindly requested.

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

Applicants have included fees for a one month extension of time and believe no additional fees are due with this amendment. However, if any additional fees are due, please charge our Deposit Account No. 03-2775, under Order No. 13156-00037-US from which the undersigned is authorized to draw.

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Respectfully submitted,

Bryant L. Young
Registration No.: 49,073
CONNOLLY BOVE LODGE & HUTZ LLP
1990 Eye Street, N.W., Suite 1100
Washington, DC 20006
(202) 331-7111
(202) 293-6229 (Fax)
Attorney for Applicant